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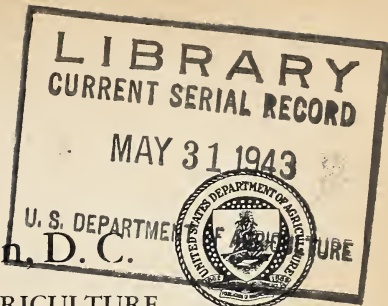
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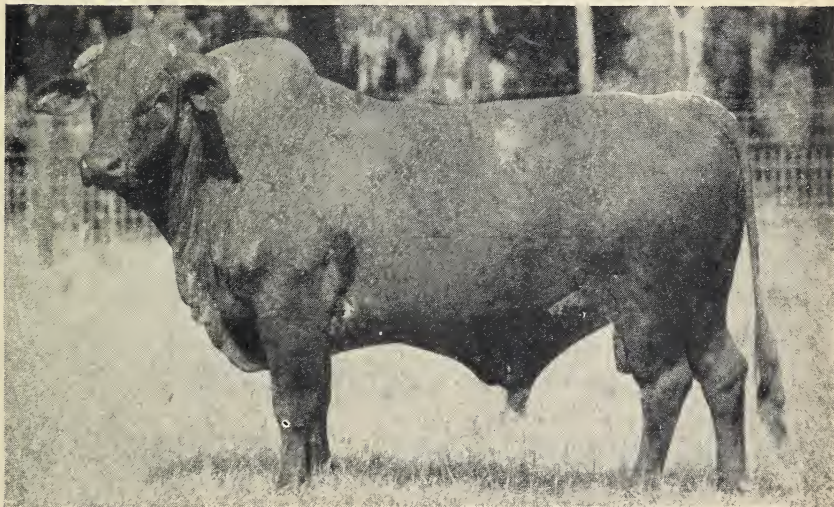
Hybrid Beef Cattle For Subtropical Climates

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ALTHOUGH in the United States there are a few herds of purebred breeds of Brahman, or Zebu, cattle and many high-grade ones, they are maintained primarily for the production of bulls for mating with the British breeds and native cattle in the Gulf coast region extending from Brownsville, Tex., to southern Florida. The objects of such matings are to increase the size of the cattle and to develop greater resistance to high humidity and temperatures. The hump and loose-skin characters of the purebred Brahman breeds become less pronounced in the crossbred cattle, being in direct proportion to the percentage of Brahman blood. Cattle having approximately one-eighth Brahman blood and seven-eighths blood of one of the British breeds usually show only a trace of the distinguishing characteristics of the Brahman breeds.

Hybrid cattle with one-fourth to one-half blood of a Brahman breed and the remainder from a British breed have demonstrated unusual ability to produce beef from grass. It is believed their greatest value will be to convert grass into beef in the humid areas of the South adjacent to the Gulf of Mexico, rather than to produce grain-finished beef in the feed lots.

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By A. O. RHOAD, *animal husbandman*, and W. H. BLACK, *senior animal husbandman*, *Animal Husbandry Division, Bureau of Animal Industry, Agricultural Research Administration*¹

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INTRODUCTION

In the Coastal Plain area of Texas and Louisiana, Brahman cattle have been extensively crossed with the range cattle to obtain a hardy, fast-growing type of beef animal that will fatten well on pasture and be adaptable to the long, hot, humid summers characteristic of the Gulf coast plains. The climate here has little or no adverse effect on the milk flow and grazing habits of cows with a noticeable percentage of Brahman blood. Brahman cattle, which originated in India, are of the species *Bos indicus*, whereas the cattle of European origin, which are common in the United States, are of the species *Bos taurus*. Indian cattle are commonly called Brahman in the United States and Zebu in South America. Several breeds of Brahman cattle are found in the Coastal Plain area, but the Guzerat is by far the most important one.

Before the eradication of the cattle fever tick the Brahmans were extensively used because of the common belief that these animals had a comparatively high resistance to this tick. As a result of the use of Brahman bulls on native and grade beef cows for nearly a half century, part-Brahman range herds are rather numerous in this area, especially in the coastal strip from New Orleans, La., to Brownsville, Tex., and extending 50 to 100 miles inland. Some high-grade herds have been established through continuous backcrossing to cattle of Brahman breeding. These animals closely resemble some of the purebred breeds of Brahman cattle. There are relatively few strictly purebred herds representing Brahman cattle in the area. Breeders of Brahman cattle have established a registry in which high grades are given what is called an A classification and purebreds an AA classification.

Brahman cattle have also been crossed with purebreds of the major beef breeds—the Hereford, Shorthorn, and Aberdeen Angus, which is commonly known as the Angus. First-generation hybrids of the Brahman-Hereford cross are called Braford's by some breeders. Similarly the term "Brahorn" is used to designate the first-generation

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Brahman-Shorthorn cross. Much of the work in crossing Brahman and Aberdeen Angus cattle has been done by the Iberia Livestock Experiment Farm of the United States Department of Agriculture at Jeanerette, La.

Although the development of new types and breeds suitable to the Gulf coast area is one of the possible results of the crossing of the Brahman and breeds of European origin, most breeders are more concerned with the development of hardy cattle for their commercial range herds. As already stated, good herds showing evidence of Brahman breeding are now found in the Gulf coast area. When promiscuous crossing methods are employed, however, the results are none too favorable. The large proportion of inferior range cattle in the Gulf coast region is due, in part at least, to lack of a well-planned breeding program.

PURPOSE AND SCOPE OF EXPERIMENTS

Experimental work has been carried on since 1916 at the Iberia Livestock Experiment Farm to determine the type of cross best suited to the high temperature and humidity conditions characteristic of the Gulf coast. Bulls of Brahman breeding, as well as those of Aberdeen Angus, Africander, Hereford, and Shorthorn breeding, have been used. The females have included native stock, grade Herefords, purebred Aberdeen Angus, and several generations of the resulting progeny.

In the early experiments bulls with Brahman blood apparently were not so desirable as the other bulls used. However, as the experiments progressed, better bulls of Brahman breeding became available. Although predominantly of Guzerat breeding, the Brahman bulls used in the early work showed some evidence of Nellore breeding and those used in the later work, some Gir breeding.

The investigations from 1916 to 1931, inclusive, followed a general plan of grading up a herd of native Louisiana cows with purebred Hereford bulls and crossing the native cows, as well as each generation of Hereford \times native cows, with bulls of Brahman breeding and backcrossing the part-Brahman cows with Herefords. During this period also, the same system of crossing was followed with a group of grade Hereford range cows from southeast Texas, that is, these cows were further graded up through four generations by the use of purebred Hereford bulls, and the foundation herd as well as each generation of the graded-up cattle was crossed with bulls of Brahman breeding and the part-Brahman offspring were backcrossed with Hereford bulls. In some instances a second backcross with Herefords was possible in each herd. In both foundation herds the same Hereford and Brahman bulls were used. Also in both herds a Shorthorn bull was used on Hereford \times native and high-grade Hereford cows.

The investigations since 1932 have involved the use of only purebred Aberdeen Angus cows as the foundation herd. Some of these cows were bred in Louisiana, and the others were obtained from herds in Oklahoma and middlewestern States. The object of the experiment was to develop a new strain of beef cattle with sufficient Brahman or Africander breeding to make it adaptable to Gulf coast climatic conditions. Both purebred and hybrid sires were used on the purebred foundation herd as well as on the hybrid offspring. In this

investigation, only one backcross was made with the Aberdeen Angus parent stock. The hybrid heifer offspring of the backcross were mated to hybrid bulls carrying various proportions of Brahman and Angus blood. Whenever possible, reciprocal crosses were made.

During the investigations the breeding herds were managed in much the same manner. Bulls were placed in the herds in March or April and taken out usually in July. The calving season, therefore, extended from late December to March. Weights of the calves were taken at birth, or as shortly thereafter as possible, and every 28 days to about 6 months of age in the case of the bulls and 2 years in the case of the heifers. Bull calves were usually castrated at 140 days of age and were weaned at 6 months. They were then used in various feeding experiments. The heifers, when 2 years of age, were placed with the breeding herd. The breeding and heifer herds were managed in accordance with good range practices. Salt and a mineral mixture were available at all times. During the grazing season no supplementary feeds, other than salt and minerals, were given. During December, January, and February these herds were fed silage, some cottonseed meal, and native grass hay. The hay was fed on pasture.

Throughout the Gulf coast area the sale of 8- to 10-month-old slaughter calves is the major source of income from the commercial beef herds. There is only a limited demand for feeder calves for shipment outside the area, and feeding to produce well-finished fat cattle is not generally practiced. Satisfactory weight for a given age largely determines the profitableness of calves marketed and is important also in determining the income per cow in breeding herds. Weights at birth and at 6 months of age were selected as providing suitable data for comparison. Heifer weight at 2 years was likewise used, for on it selection for replacement in the cow herd largely depends.

RESULTS OBTAINED WITH NATIVE LOUISIANA AND GRADE HERFORD COWS AS FOUNDATION HERDS (1916-31)

In the 16 years of investigations in which native Louisiana and grade Hereford cows were used as foundation herds, 691 calves were dropped, of which 297 were from the former herd and 394 from the latter. Of 6 methods of mating employed in each herd, the 2 that gave the most desirable results were the same in each herd.

Best results, as measured by weight at birth, at 6 months of age, and at 2 years, were obtained by first grading up the foundation herds with purebred Hereford bulls, then crossing the first-generation heifer offspring with the Brahman bulls, and finally backcrossing the hybrid offspring (fig. 1) with the Herefords. The resulting animals were of $\frac{5}{8}$ Hereford- $\frac{1}{4}$ Brahman- $\frac{1}{8}$ foundation breeding. This method is designated as breeding method No. 1.

The second-best results were obtained by backcrossing the first-generation Hereford grades with purebred Hereford bulls and then crossing the second generation with the Brahman bulls. The resulting animals were of $\frac{1}{2}$ Brahman- $\frac{3}{8}$ Hereford- $\frac{1}{8}$ foundation breeding. This method is designated as breeding method No. 2.



FIGURE 1.—Half-bred Brahman heifers sired by Brahman bulls and out of grade Hereford cows.

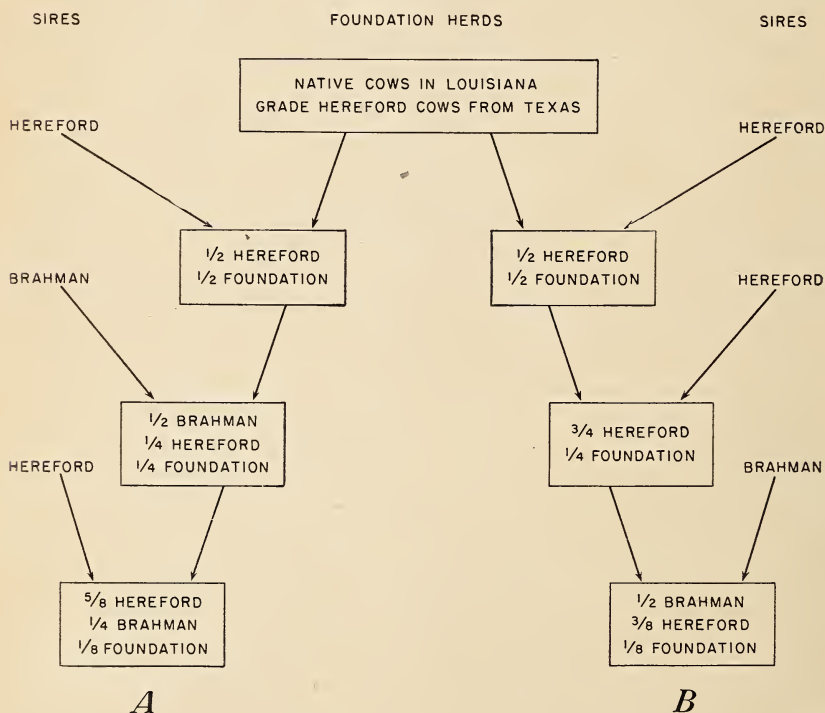


FIGURE 2.—The two methods of mating giving the best results with the use of native Louisiana and grade Hereford cows as the foundation herds: *A*, Method No. 1; *B*, method No. 2. In the crosses obtained with the use of the grade Hereford cows, the amount of the Hereford blood would be that indicated plus the amount in the foundation herd.

The two methods of mating just described are diagramed in figure 2, and the weights of the resulting offspring are given in table 1. These early experiments terminated before many of the third-generation heifers reached 2 years of age. When the numbers were too small to warrant conclusions, the data are omitted from the tables.

TABLE 1.—Average weights of calves resulting from breeding methods Nos. 1 and 2 with native Louisiana and grade Hereford foundation cows

Breeding of calves	Weights of calves from foundation herd of—							
	Native Louisiana cows				Grade Hereford cows ¹			
	Calves	Birth weight	6-month weight	2-year ² weight	Calves	Birth weight	6-month weight	2-year ² weight
Breeding method No. 1:	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
First generation ($\frac{1}{2}$ Hereford- $\frac{1}{2}$ foundation)	60	69	333	710	56	75	316	760
Second generation ($\frac{1}{4}$ Brahman- $\frac{1}{4}$ Hereford- $\frac{1}{2}$ foundation)	61	77	368	714	55	75	354	699
Third generation ($\frac{3}{8}$ Hereford- $\frac{1}{4}$ Brahman- $\frac{1}{8}$ foundation)	11	78	435	-----	59	76	402	816
Breeding method No. 2:								
First generation ($\frac{1}{2}$ Hereford- $\frac{1}{2}$ foundation)	60	69	333	710	56	75	316	760
Second generation ($\frac{3}{4}$ Hereford- $\frac{1}{4}$ foundation)	61	71	361	671	64	74	355	802
Third generation ($\frac{1}{2}$ Brahman- $\frac{3}{8}$ Hereford- $\frac{1}{8}$ foundation)	18	80	390	-----	37	83	390	-----

¹ In the crosses obtained with the use of these cows, the amount of Hereford blood would be that indicated plus the amount in the foundation herd.

² Weights of heifers only.

In both methods of breeding, a comparison of the first-, second-, and third-generation descendants in each foundation herd shows, with two exceptions, a progressive increase in weight at birth and at 6 months of age. Such increases are particularly significant at 6 months of age. The weights of the 2-year-old heifers did not increase in each succeeding generation with the same uniformity; in fact, several decreases occurred.

A comparison of the descendants of native Louisiana and grade Hereford foundation cows shows that at birth there were only small and inconsistent differences in weight. At 6 months, the descendants of the native Louisiana cows were heavier, with one exception. At 2 years of age, however, the heifer descendants from the grade Hereford cows were usually heavier. These differences in weight at 6 months and at 2 years may be attributed in part to the fact that the native Louisiana cows are better milkers and produce fatter calves at weaning, whereas their conformation indicates less beef-producing tendency than the grade Hereford cows. In this experiment the mature native Louisiana cows weighed, on the average, 676 pounds as compared with 737 pounds for grade Hereford cows.

Of the other systems of mating employed in these experiments, the continuous grading up to the Hereford for four generations showed no advantages, after the second generation, in weights of the offspring at all ages. Likewise, there were no advantages, over those obtained in grading up to the Hereford, in crossing the first-, second-, or third-generation Hereford-native Louisiana cows and high-grade Hereford cows with Shorthorn bulls. Also, there was no increase in weight at

birth or at 6 months of age by making a second backcross with the Hereford in breeding method No. 1 (fig. 2, A). In fact, there was a decrease in weight at these ages in the offspring of $\frac{5}{8}$ Hereford- $\frac{1}{4}$ Brahman- $\frac{1}{8}$ foundation cows. Poorest results were obtained at all ages in breeding purebred Hereford cows to purebred Hereford bulls.

RESULTS OBTAINED WITH PUREBRED ABERDEEN ANGUS COWS AS THE FOUNDATION HERD (1932-42)

In the 11 years of experimental crossbreeding Aberdeen Angus and Brahman cattle (fig. 3), 11 systems of mating have been employed and to the end of the year 1942, 439 calves were born. There were too few data in the later generations to warrant definite conclusions in some cases. The work has progressed sufficiently, however, to indicate the methods of mating that have given the best results thus far. These methods are outlined in figure 4 and the data are presented in table 2.



FIGURE 3.—Foundation sire of Brahman \times Angus herds at Jeanerette, La. Picture taken in 1936, when the bull was 11 years old.

Best results, as measured by weight at birth, at 6 months of age, and at 2 years in the case of the heifers, were obtained by first crossbreeding the Aberdeen Angus cows to Brahman bulls, backcrossing the first-generation half-bred heifers (fig. 5) with Aberdeen Angus sires, thereby producing the quarter-bred ($\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus) (fig. 6) and also by mating the first-generation half-bred heifers to the $\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus sire, thereby producing the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus. By mating the quarter-bred heifers to $\frac{1}{2}$ Brahman- $\frac{1}{2}$ Angus sires (fig. 7), the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus crossbred is again produced through the reciprocal cross. The breeding method just described is outlined under breeding method No. 1 (fig. 4, A).

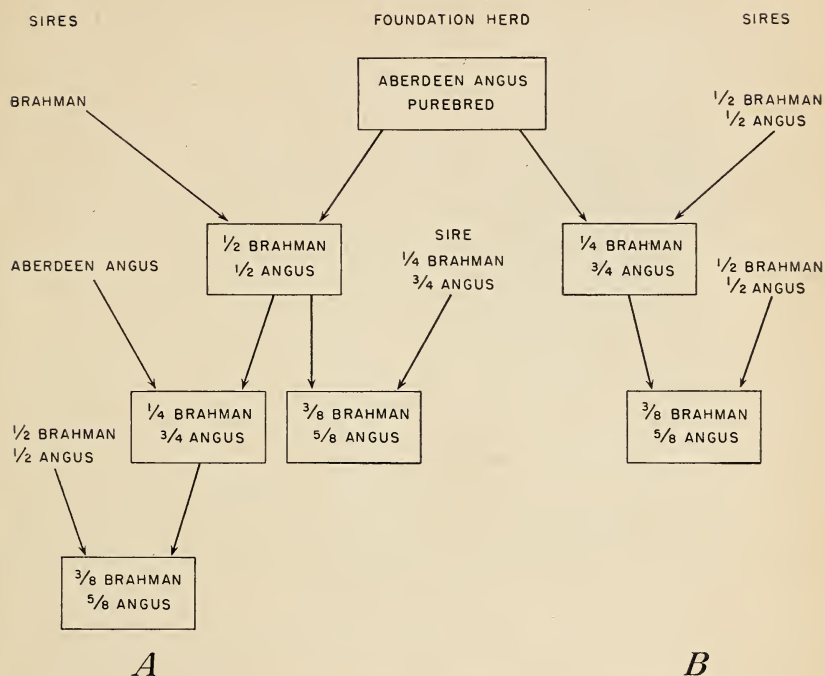


FIGURE 4.—The two methods of mating giving best results with the use of purebred Aberdeen Angus cows as the foundation herd: A, Method No. 1; B, method No. 2.



FIGURE 5.—Half-bred (Brahman \times Angus) heifers from Aberdeen Angus dams and a Brahman sire.

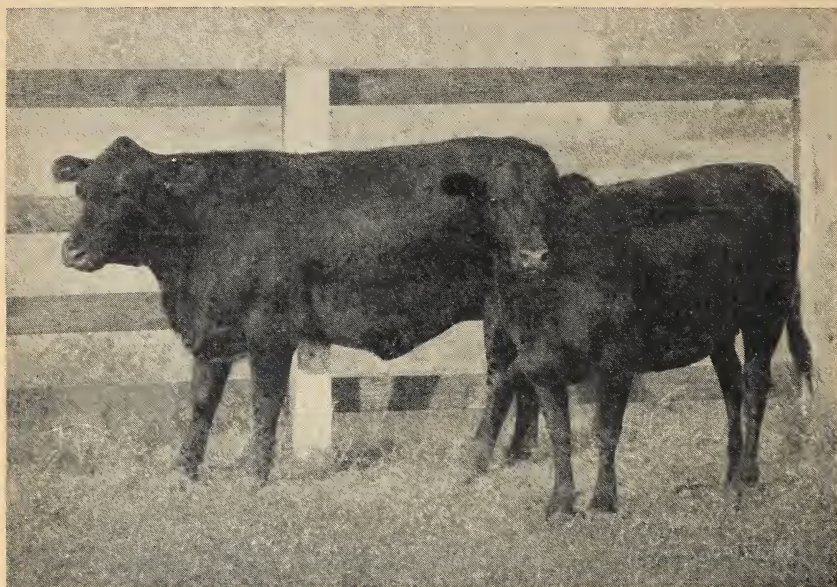


FIGURE 6.—Heifers, $\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus.



FIGURE 7.—Half-bred (Brahman \times Angus) bulls. The one at the right consistently produced offspring that were above average in weight and type; the one at the left (a half brother) consistently produced offspring below average in these respects.

TABLE 2.—*Weights of calves resulting from breeding methods Nos. 1 and 2 with Aberdeen Angus foundation cows*

Breeding of calves	Calves	Weights of calves at—		
		Birth	6 months	2 years ¹
Breeding method No. 1:	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
First generation ($\frac{1}{2}$ Brahman- $\frac{1}{2}$ Angus).....	114	70	368	768
Second generation ($\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus) ²	105	62	441	800
Second generation ($\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus) ³	15	61	378	-----
Third generation ($\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus).....	15	60	358	-----
Breeding method No. 2:				
First generation ($\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus).....	63	67	363	807
Second generation ($\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus).....	5	71	313	-----

¹ Weights of heifers only.² Aberdeen Angus sire.³ $\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus sire.

The second-best results were obtained by breeding method No. 2 (fig. 4, B), that is, backcrossing the $\frac{1}{2}$ Brahman- $\frac{1}{2}$ Angus sire with Aberdeen Angus cows and then mating the heifer offspring to the $\frac{1}{2}$ Brahman- $\frac{1}{2}$ Angus, producing again the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus crossbred.

Table 2 shows that of the two groups of quarter-breds (second generation under breeding method No. 1 and first generation under breeding method No. 2) those from Aberdeen Angus cows and a half-bred sire were slightly heavier at birth and at 2 years of age than the reciprocal quarter-breds from half-bred cows and Aberdeen Angus sires. The latter, however, were materially heavier at 6 months. Of the three groups of $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Angus crossbreds, those from half-bred cows and quarter-bred sires were significantly heavier at 6 months than either of the other groups.

Similar crossbreeding work with the use of Africander instead of Brahman bulls was initiated in 1935. In this system of breeding, 165 calves had been dropped by the end of 1942. The first-generation crossbreds from purebred Aberdeen Angus cows and purebred Africander bulls weighed, on the average, 66 pounds at birth, 363 pounds at 6 months of age, and 758 pounds at 2 years. The dams were the same purebred cows that produced the half-breds (Brahman \times Angus) shown in table 2, first generation under breeding method No. 1. To 2 years of age the weights of the half-bred Africanders were about equal to those of the half-bred Brahmans. As mature cattle, however, they were lighter than half-bred Brahmans. The number of progeny in the other Africander groups was too small for direct weight comparisons with similarly bred Brahman hybrids.

UNIFORMITY OF TYPE AND TEMPERAMENT

Uniformity of type and temperament is more difficult to obtain in hybrid animals than in purebreds. Experiments at Jeanerette have shown that some hybrid sires—the one at the right in figure 7, for instance—consistently produce progeny that are above the average both in weight and type. The progeny of other hybrid sires—the one at the left in figure 7—are consistently below average in these respects. Of two other half-bred (Brahman \times Angus) bulls (half brothers), one produced a group of calves that were more uniform in size and type, quieter in disposition, and more tractable than those of the other.

Some hybrid cows likewise consistently give birth to superior offspring and others to inferior ones. At Jeanerette, a half-bred (Brahman×Angus) cow had six outstanding calves sired by four different bulls. A quarter-bred cow, whose dam was a half-bred and of a nervous type, was herself very nervous and produced four very nervous calves by three different bulls. This cow and her offspring, although of acceptable beef-type conformation, were culled from the herd.

GENERAL RECOMMENDATIONS

When Brahman×Hereford or Brahman×Shorthorn bulls of good quality and type are used on range cows along the Gulf coast, the experiments indicate that success largely depends on the type of breeding of the herds in which they are placed. It is recommended that if possible the hardy native cows be bred to purebred beef bulls and that the resulting heifer offspring be mated to hybrid beef bulls, one parent of which was a purebred of the same breed that sired the heifers and the other parent predominantly of Brahman breeding. In all later generations quarter-bred Brahman bulls should furnish sufficient hardiness in the offspring to maintain their resistance to subtropical climates and retain a noticeable amount of Brahman breeding in the future cow herd. In general, it is recommended that hybrid bulls used have the same blood lines as were represented in the sire of the heifers.

As with other types of cattle, Brahmans or part Brahmans used for breeding purposes should be selected on the basis of individual merit. This involves not only desirable beef-type conformation and proved ability to transmit desirable qualities to the progeny, but also tractability. Most Brahmans when properly managed can be made quite as tractable as other cattle. This quality is improved through breeding methods, chiefly by culling from the breeding herd all individuals that are extremely nervous and by using as sires only bulls from quiet Brahman or part-Brahman dams.

SUMMARY AND CONCLUSIONS

Experiments with beef cattle to determine the type of cross best suited to the high temperatures and humidity of the Gulf coast are reported. This work, begun in 1916, is being conducted at the Iberia Livestock Experiment Farm, Jeanerette, La. Brahman bulls, as well as Aberdeen Angus, Africanders, Herefords, and Shorthorns, were used. The females were native Louisiana stock, grade Herefords, purebred Aberdeen Angus, and several generations of the progeny. Comparisons were made on the basis of weights at birth, at 6 months, and at 2 years of age.

When only purebred Hereford bulls were used on either native or grade Hereford foundation cows, best results were obtained by first grading up the foundation herds with these bulls, then crossing the first-generation heifer offspring with Brahman bulls, and finally backcrossing the hybrid offspring with purebred Herefords. The resulting animals were of $\frac{2}{3}$ Hereford- $\frac{1}{4}$ Brahman- $\frac{1}{8}$ foundation breeding.

Second-best results were obtained by backcrossing the first-generation grade Hereford heifers with purebred Hereford bulls and then

crossing the second-generation heifers with Brahman bulls, producing as the final result animals of $\frac{1}{2}$ Brahman- $\frac{3}{8}$ Hereford- $\frac{1}{8}$ foundation breeding.

When purebred Aberdeen Angus cows were the foundation stock, best results were obtained by first crossbreeding these cows to Brahman bulls and then backcrossing the first-generation half-bred heifers with the Aberdeen Angus sires, producing in the second generation the quarter-bred ($\frac{1}{4}$ Brahman- $\frac{3}{4}$ Aberdeen Angus), and also by mating the first-generation half-bred heifers to the quarter-bred, thereby producing the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Aberdeen Angus. Likewise, second-generation quarter-bred heifers when mated to the half-bred produced the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Aberdeen Angus.

Almost as good results were obtained by backcrossing half-bred Brahman bulls with purebred Aberdeen Angus cows, thereby producing the $\frac{1}{4}$ Brahman- $\frac{3}{4}$ Angus, and then mating such heifers to half-bred Brahman bulls, producing the $\frac{3}{8}$ Brahman- $\frac{5}{8}$ Aberdeen Angus. Both the quarter-bred and three-eighths-bred produced by the second breeding method are the reciprocal crosses to those produced by the first breeding method.

For the Gulf coast area, Brahman hybrid beef-type bulls are recommended for use on range cows with one-half to three-fourths the blood of a pure beef breed. One parent of the hybrid bulls should be of the same pure beef breed that sired the range cows and the other parent predominantly of Brahman breeding and of acceptable beef-type conformation.

